COUPLING STRUCTURE OF HOOD LOCK STAY

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention relates to a coupling structure of a hood lock stay which is coupled each other with almost center portions of a radiator core support upper member and a radiator core support lower member of a radiator core support of a motor vehicle such as an automobile, the hood lock stay securing a hood lock to the upper portion thereof.

2. DESCRIPTION OF THE RELATED ART

A conventional radiator core support for an automobile is disclosed for example in Japanese Patent Laid-Open No. Tokkai 2002-120760. This radiator core support is mainly composed of a radiator core support upper member extending in a transverse direction of the automobile and a radiator core support lower member running parallel thereto under the same, a radiator core support side member coupling the right and left ends of the radiator core support upper member and those of the radiator core support lower member with each other, and a hood lock stay coupling each center portion of the radiator core support upper member and the radiator core support lower member with each other.

However, in the radiator core support in the prior art, the upper portion of the hood lock stay and the radiator core support upper member are secured to each other with their surfaces being appressed to each other. Therefore, stiffness shows a tendency to lower around the coupled part of the radiator core support upper member with the hood lock stay. As a result, at the time, for example, of a safety inspection of a motor vehicle, when an inspector put his/her hand on the radiator core support upper member with his/her weight thereon, there occurs a problem of lacking the stiffness.

Further, the hood lock stay of the lower stiffness is impossible to secure the hood lock in a stable manner, so that there is a probability of causing a flip-flop of an engine hood and of lowering sound vibration performance while driving.

SUMMARY OF THE INVENTION

The present invention is made by focusing on the previously-mentioned problems. An object of the present invention is to provide a coupling structure of a hood lock stay capable of improving stiffness around a coupled part of a radiator core support upper member with a hood lock stay, and of realizing stable securing of the hood lock.

The coupling structure of the hood lock stay of the present invention is composed of the radiator core support upper member extending in a traverse direction of a motor vehicle, a radiator core support lower member extending under the radiator core support upper member in the traverse direction of the vehicle, and the hood lock stay which is coupled in a vertical direction of the vehicle each other with almost center portions of the radiator core support upper member and the radiator core support lower member, the hood lock stay securing a hood lock to an upper portion thereof, in which the radiator core support upper member is formed to have at least an opened cross-sectional shape provided with a wall portion, and the radiator core support upper member and the hood lock stay are coupled with each other in a state forming a box shape by disposing the upper portion of the hood lock stay so as to cover an opening of the opened cross-section of the radiator core support upper member.

In the above-described coupling structure of the hood lock stay, the radiator core support upper member and the hood lock stay are coupled with each other in the state forming the box shape by themselves.

Consequently, this box shape enables to improve the stiffness around the coupled part of the radiator core support upper member with the hood lock stay, allowing, as a result, those improvements in the stiffness to the level ensuring enough stiffness resistant to an inspector's weight at the time for example of the safety inspection of the radiator core support upper member of the motor vehicle, in engine hood fastening performance, and in sound vibration performance.

Preferably, the hood lock stay is formed in the upper portion thereof with a recessed portion which is recessed in a front-to-rear direction of the motor vehicle, and with a wall portion of the recessed portion, the opening of the radiator core support upper member is covered to thereby form the box shape.

In order to form the box shape, what used are the recessed portion formed by recessing the upper portion of the hood lock stay in the front-to-rear direction and the reverse surface of the radiator core support upper member so that the stiffness of the upper portion of the hood lock stay can be improved and that no additional parts for forming the box shape is required.

Preferably, the recessed portion is formed essentially all over the vertical length of the hood lock stay.

Since the recessed portion is formed essentially all over the vertical length of the hood lock stay, entire stiffness of the hood lock stay can be improved to thereby further serve to improve entire stiffness of the radiator core support.

Preferably, the wall portion of the radiator core support upper member is composed at least of an upper wall portion having an almost horizontal surface and a vertical wall portion adjoining the upper wall portion and extending in the transverse and vertical direction of the vehicle.

Consequently, the upper portion of the hood lock stay is in the state supporting the upper wall portion of the radiator core support upper member, so that the stiffness of the radiator core support upper member, particularly that in the vertical direction of the vehicle, can be enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features, and advantages of the present invention will become apparent as the description proceeds when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is perspective front view showing a hood lock stay of an embodiment according to the present invention;

FIG. 2 is perspective rear view showing the hood lock stay of FIG. 1 according to the embodiment; and

FIG. 3 is a cross-sectional side view, taken along a S3 - S3 line in FIG. 1, of an top end portion of the hood lock stay .

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, an embodiment of the present invention will be described based on the drawings.

FIG. 1 is a perspective front view showing a coupling structure of a hood lock stay according to the embodiment of the present invention;

FIG. 2 is a perspective rear view showing the coupling structure of the hood lock stay according to the embodiment of the present invention; and

FIG. 3 is a cross-sectional view taken along an S3 - S3 line in FIG. 1.

As shown in FIG. 1 and FIG. 2, in the coupling structure of the hood lock stay according to the embodiment of the present invention, a radiator core support 1 is composed of a radiator core support upper member 2 and a radiator core support lower member 3 extending in the traverse direction of a motor vehicle in the upper and the lower positions respectively, and a hood lock stay 4 extending in the vertical direction while being coupled each other with the center portions of the radiator core support upper member 2 and the radiator core support lower member 3. These three components, the radiator core support 1, the radiator core support upper member 2, and the radiator core support lower member 3 are all made of metal.

Further, the radiator core support upper member 2 is formed to have a U-shaped cross-section opened rearward. A center portion 2a located at the center of the radiator core support upper member 2 is formed to fit in the shape of a hood lock 6 and is provided by extending from the bottom end of the front surface side of the radiator core support upper member 2 to the lower side.

Furthermore, in the adjacent left and right positions to the center portion 2a, there are formed bolt through holes 2b, 2b as described below.

The radiator core support lower member 3 is formed to have the U-shaped cross-section opened rearward and is welded and secured by spot welding to the two places X1, X1 at the right and left of the lower portion of the hood lock stay 4.

At the right and left ends of the hood lock stay 4, there are provided flange portions 4a, 4a bent to rearward side. Also, at the center of the hood lock stay 4, a recessed portion 4b being recessed rearward side is formed essentially all over the vertical length of the hood lock stay 4.

As shown in FIG. 3, further, the recessed portion 4b has a hood lock plate 5 welded and secured by spot welding at two places X2, X2 of the lower right and left portions of the same, the hood lock plate 5 having a bolt through hole 5a.

As shown in FIG. 1 and FIG. 2, the hood lock stay 4 is formed to have an upper portion 10 being curved and expanding gradually in the horizontal direction upward from almost vertical midpoint thereof.

The upper portion 10 of the hood lock stay 4 is welded and secured by spot welding at two places X3, X3, as shown in FIG. 2, to the reverse surface 2c of the center portion 2a of the radiator core support upper member 2.

Also, in the upper portion 10 of the hood lock stay 4, there are formed relief holes 4c, 4c for a fixed bolt, not shown, for bolting the hood lock 6.

As shown in FIG. 3, the edge of the upper portion 10 of the hood lock stay 4 is bent rearward to form in an L-shape to have a flat portion 4d which is welded and secured by two spot welding at two places X4, X4 to the right and left of the upper wall portion 2d continuing from a vertical wall portion 2e on the reverse surface 2c of the radiator core support upper member 2.

Accordingly, as shown in FIG. 3, the upper wall portion 2d of the radiator core support upper member 2 is secured to the flat portion 4d of the hood lock stay 4 in the state supported by the flat portion 4d, so that the stiffness in the vertical direction of the radiator core support upper member 2 is enhanced.

Additionally, as shown in FIG. 3, a box shape 11 is formed surrounded by the vertical wall 2e on the reverse surface 2c of the radiator core support upper member 2 including the center portion 2a and the recessed portion 4b of the

upper portion 10 of the hood lock stay 4. As a result, it is designed so that high stiffness is ensured around the coupled part of the radiator core support upper member 2 with the hood lock stay 4.

Note that it is not required to form a complete closed space inside the box shape 11, and such a space as partly opened may be formed therein to the extent that the high stiffness is ensured.

Also, as shown in FIG. 1 to FIG. 3, the hood lock 6 is secured by being concluded with three places in total, namely to the bolt through hole 5a of the hood lock plate 5 and to the two bolt through holes 2b, 2b of the radiator core support upper member 2 by inserting bolts therethrough from the front side respectively.

Consequently, in the coupling structure of the hood lock stay of the present embodiment, the reverse surface 2c of the radiator core support upper member 2 including the center portion 2a and the upper portion 10 of the hood lock stay 4 form the box shape 11 to thereby allow to improve the stiffness around the coupled part of the radiator core support upper member 2 with the upper portion 10 of the hood lock stay 4, so that, as a result, improvement in stiffness can be made to the level ensuring enough stiffness even when an inspector put his/her hand on the radiator core support upper member 2 with his/her weight thereon at the time for example of a safety inspection of the radiator core support upper member of the motor vehicle.

Further, since the hood lock 6 is secured to the three places in total, namely to the radiator core support upper member 2 and the hood lock plate 5, the hood lock 6 can be stably secured, whereby bringing about effects of enabling improvement in engine hood fastening performance and sound vibration performance.

While a preferred embodiment of the present invention has been described

hereinbefore, it is to be understood that the particular features of the present invention are not intended to be limited to the present embodiment, and any change in design and the like may be made therein without departing from the spirit of the invention. Such changes are also included in the scope of the present invention.

For example, the materials and the securing manners of the radiator core support upper member 2, the radiator core support lower member 3, and the hood lock stay 4 of the present embodiment may be set appropriately.

Moreover, the welding place and the number of the spot welding at the places X1 to X4 may be set appropriately.

Additionally, as a fastener other than the spot welding at the places X1 to X4, the bolt or a nut may be used.